OBJECTIVES FOR MA4372 (INTEGRAL TRANSFORMS)

Text: Integral Transforms and Their Applications, Lokenath Debnath, CRC Press; 1995.

The basic objective of this course is to obtain knowledge of and sound computational ability in using the major integral transforms: Laplace, Fourier, Hankel, and Mellin. Hankel transforms will be studied and compared with the method of eigenfuction expansions at the end of the course.

Specific objectives include:

1. Know the various definitions of the Fourier transform, sufficient conditions for its existence, how to compute basic Fourier transform pairs.
2. Be able to use the Fourier transform to solve boundary-value problems of mathematical physics (both ODEs and PDEs).
3. Know the definitions of the Fourier sine and cosine transforms and how to apply them to the solution of appropriate boundary value problems.
4. Know the definition of Fourier transforms in higher dimensions, and be able to apply it to the solution of PDEs.
5. Know the definition of the Laplace transform, conditions for its existence, the inversion formula, and how to compute and invert various Laplace transforms.
6. Know the various \rules" (convolution theorems, etc.) for the Fourier and Laplace transforms and how to use them.
7. Know how to apply the Laplace transform to solve boundary value problems.
8. Know how to apply the joint Laplace and Fourier transforms for the solution of boundary value problems.
9. Know the definitions of the Hankel and Mellin transforms, what boundary value problems they are useful for, and how to use them.